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BOVINE TUBERCULOSIS: THE EXAMINATION, UNDER FIELD CONDITIONS, OF BOVINE EXPECTORATE AND DISCHARGES FOR *M. TUBERCULOSIS*

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MAIDSTONE

(*a*) EXPECTORATE.
(*b*) GLANDULAR DISCHARGE.
(*c*) UTERINE DISCHARGE.
(*d*) URINE.
(*e*) FAECES.

That the direct microscopic examination of expectorate is a reliable measure for the detection of cattle affected with open tuberculosis of the lungs will be generally admitted by those whose duties, under the Milk and Dairies Acts and Orders and Tuberculosis Order, have comprised both the microscopic examination of samples from suspected cows and the slaughter of those detected as affected. The value of the method is particularly marked where positive results are obtained, but there is little published evidence as to its deficiencies in the opposite direction, namely, in the return of false negatives.

Errors may occasionally arise through the attribution of a positive sample of expectorate to the wrong cow (sputum is, of necessity in veterinary practice, frequently obtained indirectly from the wall or manger in front of dairy cows) or through the presence of non-tuberculous acid-fast bacilli being regarded as tubercle bacilli. In the former case errors may usually be avoided if a practice is made of obtaining a second sample from cows showing no good confirmatory evidence of tuberculous disease on physical examination, and in the latter case by the more detailed laboratory examination of samples containing acid-fast bacilli not typical of tubercle bacilli.

Errors may more frequently arise in the opposite direction through assuming that open tuberculosis of the lungs does not exist on account of failure to demonstrate tubercle bacilli in the sputum. This is quite liable to occur since the number of bacilli in the expectorate is by no means always an accurate indication of the extent or activity of the lesions. Furthermore, in some instances the bacilli may be restricted to a small portion of the sample.

It has been estimated by Corper (1938), quoted in an editorial article[1] in the *British Medical Journal*, that tubercle bacilli require to be present at over 100,000 per c.cm. of human sputum before being detectable by microscopic examination.

Where tubercle bacilli cannot be demonstrated by direct microscopy their presence may be revealed by the adoption of concentration methods, cultivation on suitable media or inoculation into susceptible animals such as guinea-pigs, etc.

In this paper it is not proposed to discuss the variations of technique which may be used but only those which have proved successful in the hands of the writer.

Bovine Expectorate and Expectoration

As the result of the examination of over two thousand samples of bovine sputum, the writer is convinced that one cannot safely predict from its appearance to the naked eye that any one sample will be negative, but one can, on the other hand, make a very much more accurate prediction that certain samples will be positive. For instance, the commonest samples that are positive are white, yellowish or golden yellow in colour. Less commonly seen are whitish samples containing discrete whiter or yellow firm or gritty centres (small pieces of either caseous or calcified matter). These are almost invariably positive. Sputa that are grayish or slightly black in colour are usually negative though positive samples of this nature are sometimes obtained. Such samples may possibly be pharyngeal in origin. Tubercle bacilli may occasionally be found in nasal discharge but in very much smaller numbers than in the ordinary bronchial expectorate from the same cow.

The volume of the sample of expectorate is not a guide as to the likelihood of its being positive or otherwise as the most minute samples of sputum that can be seen may give a positive result and large samples of 3 to 4 c.c. in volume may be either positive or negative. Similarly, the frequency of expectoration by a cow cannot be taken to reflect the presence or absence of open tuberculosis of the lungs, for a few cows have been kept under observation for prolonged periods after giving one positive sample of sputum before expectorating again. In some cases the intervals between expectoration in cows with open tuberculous lesions of the lungs may exceed one month; this may be due sometimes to the rather dry nature of the lesions, or their being partly circumscribed by fibrosis and only communicating with small bronchioles, or due to the fact that sputum is more often swallowed by cattle than expectorated. In cases of miliary tuberculosis of the lungs

(without localised lung lesions of non-miliary type) there may be little or no expectoration until late in the disease process or even not at all.

The wall or the manger in front of the cow very often gives a good history of the cow's expectoration on account of the long intervals between the cleaning of the walls and the prolonged periods for which cows may occupy the same stall. Frequently expectorate may be obtained from the wall in front of the cow in all stages from absolute freshness to complete desiccation. Sputum which is white in the fresh state becomes yellower in colour as desiccation progresses until finally it may resemble flakes of maize. Such dry sputum regains its former consistency and colour by being soaked in water and tubercle bacilli may easily be demonstrated in dry specimens that are months old.

The Collection of Samples of Sputum for Examination.—The greatest difficulty that besets the veterinarian is the collection of bovine sputum in a reasonably sterile state. Samples are usually obtained from the wall or manger in front of the cow; such samples are frequently contaminated with organisms which may prove difficult to eliminate in cultivation but which would, however, seldom be mistaken for tubercle bacilli microscopically. It is desirable, however, that all samples should be collected as aseptically as possible and where concentration and cultural methods are to be used the employment of sterile plugged tubes and collecting instruments is absolutely essential.

Brook[1] (1937) has described in detail the surgical methods which may be adopted to obtain sputum for bacteriological examination. The enforced adoption of such surgical means is not, however, empowered by the existing legislation in this country. The usual measures adopted are the induction of coughing by closure of the nostrils, enforced exercise, or pressure on the upper rings of the trachea and the collection of expectorate from a clean surface in front of the animal.

It is, of course, essential that all positive samples can be attributed without failure to the correct cow and for this purpose an accurate description of all cows sampled should be recorded. Where no physical signs of tuberculosis are detectable a second positive sample is considered as essential for confirmatory evidence of the presence of disease, unless the first sample was collected directly from the cow.

Direct Microscopic Examination.—The positive diagnosis of tuberculosis by the direct microscopic examination of sputum has, in the writer's own experience, given extremely reliable results, as of over 400 cows slaughtered as tuberculous on the microscopic examination of their expectorate only one cow was found at *post-mortem* examination to be free from visible tuberculous lesions of the lungs.

In the making of a positive diagnosis on direct microscopic examination, grave exception should be taken to the presence of non-typical and aberrant forms of acid-fast bacilli in a proportion of more than 10 per cent. of the organisms seen. In such cases the sample should be submitted for further examination—preferably by cultivation. For convenience the Ziehl-Neelsen method of staining smears for the demonstration of tubercle bacilli is here quoted :—

Ziehl-Neelsen Method of Staining for Tubercle bacilli
(slightly modified)

1. Allow smear to dry in air.
2. Fix with heat.
3. Cool.
4. Stain with carbol fuschin for five minutes, heating until it steams but does not bubble.
5. Wash in water.
6. Decolourise in 4 per cent. acid alcohol (4 per cent. HC1. conc. in methylated spirits) for three or four minutes.
7. Wash in water.
8. Decolourise in 25 per cent. sulphuric acid for five to ten minutes, washing occasionally to observe the process of decolourisation. The slide should be quite decolourised or at most only show a faint trace of pinkness after washing.
9. Wash in water.
10. Counterstain with methylene blue for half a minute.
11. Wash quickly, blot with fluffless filter paper and dry with slight heat.

An aqueous solution of picric acid may be used with advantage as counterstain instead of methylene blue for smears of pus (see later).

The Examination of Dry Sputum.—Desiccated specimens of sputum may be soaked out in sterile water, when they quickly regain their former consistency—the process may be accelerated by using warm water. Some difficulty may be experienced in obtaining adhesion of such samples to the slide on account of the unavoidable transference of surplus moisture to the slide. This may be overcome by smearing the sample on a slide which is heated as required over a bunsen flame.

Examination of Sputum after Concentration.—The organisms of tuberculosis appear in concentration preparations in from twice to forty times the numbers observed on direct microscopic examination. This method is, therefore, of value in the examination of samples showing extremely few bacilli or those which are apparently negative.

The technique adopted is a simplification of that used in the laboratory of the County Medical Officer for Kent.

Concentration Technique.—As large a quantity of sputum as possible is mixed with from 5 to 15 c.c. of the concentration fluid in a rubber stoppered tube. The tube is shaken vigorously at intervals until the sample is dissolved. This takes from 10 to 30 minutes, according to the viscosity of the specimen, but it is accelerated by keeping the tube warm. The liquid is then centrifuged at a high speed for at least ten minutes. The supernatant fluid is poured off by quickly inverting the tube and a film is made of the deposit which is collected from the tip of the still inverted tube on a looped needle. The film should be spread on the slide in a small area and stained in the usual manner.

The concentrating fluid consists of 3 per cent. Chloros (Imperial Chemical Industries product) in a 0·5 per cent. solution of caustic soda. The solution should be kept in an amber bottle and if kept in the dark may be used successfully for up to 12 months. Chloros may be replaced in the solution by other similar chlorinated solutions (liq. sodae chlorinatae, etc.).

For the proper estimation of the value of the concentration technique in the search for tubercle bacilli

definite standards had to be adopted regularly for comparison. For instance, all samples were examined microscopically for five minutes and the number of organisms (if any) detected on direct examination was recorded, and similarly after concentration. All samples showing, in the five minutes' examination, more than five acid-fast bacilli morphologically typical of tubercle bacilli were classed as positive; those showing from 3 to 5 as positive if physical signs suspicious of tuberculosis (and no other disease) were detectable on auscultation of the lungs, but as doubtful in the absence of suspicious symptoms. Where three or less organisms were found the sample was classed as negative unless the organisms were all typical and suspicious clinical symptoms were present, when it was placed in the doubtful category.

In Table I details are given of 20 cases where a negative or doubtful result (as defined above) was obtained on microscopic examination of part of the sample of expectorate, the remainder of which gave a positive result after concentration. The figures in parenthesis in column 2 indicate the number of bacilli seen; where no figures are inserted no bacilli were seen. The time spent in searching the slide was always five minutes unless otherwise stated.

The results of the *post-mortem* examinations recorded in the last column of Table I are classified as "Advanced" or "Not Advanced," as defined by by Tuberculosis Order of 1925, with the exception of cases 19 and 20, which were slaughtered under the later Tuberculosis Order of 1938.

In nine cases the extent of the disease present came under the category of "Not Advanced," as defined by the Tuberculosis Order, and in ten cases the disease was of the category "Advanced."

In all, 138 samples of sputum or pus, all of which gave a negative or doubtful result on microscopic examination (129 negative and 9 doubtful), were examined by the concentration technique, and 29 were found by that method to be positive and 10 gave a doubtful result. The number of positives detected by the use of the concentration method is approximately 20 per cent. more than by direct microscopic examination alone. Of the 29 cows thus found to be excreting tubercle bacilli, 27 were slaughtered (under the Tuberculosis Order) and found to be affected with tuberculosis of the lungs in sputum cases or appropriate glands in pus cases. In one case the origin of the sample of sputum was in doubt and the guilty cow was not discovered (no cow being slaughtered) and in the other case the cow did not come within the scope of the Tuberculosis Order of 1925 (tubercle bacilli were found in the pus from a popliteal abscess, but the cow showed no evidence of cough or emaciation). The *post-mortem* examinations showed that in many cases there was extensive disease of the lungs though in some cases there were only comparatively early lesions present.

The Cultural Examination of Sputum.—The particular value of this method is for the detection of bacilli which are present in too small a number to be detected by direct microscopic examination, or after the use of the concentration method, and also to identify acid-fast organisms which are not of the typical appearance of tubercle bacilli.

Where samples are being obtained for cultural examination it is especially important to avoid the possibility of contamination with tubercle bacilli from another source as the presence of one bacillus could give rise to a positive culture.

The method adopted, on the recommendation of Dr. Stanley Griffith (personal communication—February, 1935), was cultivation on a plain egg medium after treatment of the sputum for 30 to 45 minutes at 37° C. with an equal volume of sterile 5 per cent.

Table I.—Concentration Tests of Bovine Sputa. (Positive)

No.	Result of Microscopic Examination	Result of Examination After Concentration	Result of *Post-mortem* Examination of Cow
	Mins.	Mins.	
1	–. 1 in 20	+	Advanced tuberculosis.
2	–. 2 in 12	+ 35 in 3	Advanced tuberculosis.
3	–. 1 in 10	+ 8 in 11	Tuberculosis—not advanced.
4	–. 2 in 12	+ 16 in 2 |	Advanced tuberculosis.
5	–. 2 in 5	+ 30 in 2	Tuberculosis—not advanced.
6	–. 1 in 12	+ 6 in 12 |	Advanced tuberculosis.
		+ 6 in 5	Advanced tuberculosis.
7	–.	+ 3 in 5 (Clinical symptoms)	Advanced tuberculosis.
8	–.	+ 30 in 3	Confirmed biologically. Not advanced.
9	–.	+ 36 in 5	Advanced tuberculosis.
10	–. 2 in 5	+ 8 in 5	Advanced tuberculosis.
11	–.	+ 3 in 5 (Clinical symptoms)	Tuberculosis.
12	–.	+ 20 in 5	Tuberculosis—not advanced.
13	–.	+ 20 in 5	Tuberculosis—not advanced.
14	–.	+ 30 in 5	Tuberculosis—not advanced.
15	–.	+ 10 in 5	Tuberculosis—not advanced.
16	–.	+	Advanced tuberculosis.
17	–.	+	Advanced tuberculosis.
18	–.	+	Tuberculosis—not advanced.
19	–.	+	Tuberculosis—not advanced.
20	–.	+ 20 in 5	Advanced tuberculosis.

caustic potash-solution. All three types of tubercle bacillus (human, avian and bovine) can be grown without difficulty on this medium though the human type grows better in the presence of glycerine which is inhibitory to the growth of most bovine strains. It is for this reason (the presence of glycerine) that most media used for the cultivation of human tubercle bacilli are unsuitable for the isolation of bovine tubercle bacilli. Loewenstein's medium with the glycerine omitted has also been used but does not appear so suitable as the plain egg medium.

On account of the difficulty of obtaining sputum from cattle without contamination with other organisms a rather high proportion of samples was spoilt (overgrown) by contaminating organisms, but the method has nevertheless proved of great value in selected cases, particularly in cases showing suspicious physical signs with apparently negative sputa and where acid-fast bacilli dissimilar to tubercle bacilli have been found in the sputum.

For the use of cultural methods no elaborate equipment is necessary, the most important being an incubator and sterilising apparatus. An ordinary vegetable steamer may be used for sloping and sterilising the medium with perfect success. The medium may be prepared as follows :—

Scrub the required number of fresh new laid eggs with soap and water and place in methylated spirits for a few minutes. Pass the eggs through a bunsen flame and break the shells on the edge of a cylindrical measure into which the eggs are dropped. One part of normal saline (0·85 per cent. NaCl) should be added to two parts of egg. The mixture should be poured into a flask and the yolks punctured with a piece of drawn-out glass. Shake until the whites and yolks are thoroughly mixed, without undue frothing. Filter through coarse muslin over a funnel into a bottle and stand for half an hour to allow bubbles to rise. Distribute by means of a distributing funnel from 5 to 7 c.c. into tubes. Slant in a steamer or water bath and coagulate in this position for ½ to ¾-hour at 85° C. Sterilise by heating at 100° C. in a steam steriliser for 20 to 30 minutes on three successive days. It has been found more convenient in laboratory work performed without any assistance to use 1 oz. metal-screw-capped glass vials (obtainable from the United Glass Bottle Co.) as less labour is required than where plain test tubes are used, which have to be plugged with cotton wool and then sealed with paraffin wax to prevent desiccation of the medium during the prolonged period of incubation.

The sputum is treated with an equal volume of sterile 5 per cent. solution of KOH for half to three-quarters of an hour in the incubator at 37° C. and the mucinous product is sown without neutralisation on two or three egg slopes, being spread evenly and thinly. The tubes are incubated for 10 to 14 days when smears are prepared and examined and, if negative, the cultures are incubated for a further two or three weeks and examined again.

Positive cultures should conform with the well-known characteristics of the tubercle bacillus—acid-alcohol fastness, slow growth (growth frequently not visible for two to three weeks with bovine strains), typical cultural appearances, etc.

Where contaminations occur there can be no assumption as to the presence of tubercle bacilli or otherwise and where negative uncontaminated cultures are obtained it is only regarded as strong presumptive evidence of the absence of tubercle bacilli, as in some cases where only a few tubercle bacilli are present these may be killed by the treatment with KOH to eliminate contaminants.

The following table gives details of cases where positive cultures were obtained and the results of the *post-mortem* examinations are classified as "Advanced" or "Not Advanced," as defined in the Tuberculosis Order of 1925.

Table II.—Cultural Examinations of Bovine Sputa. (Positive)

No.	Result of Microscopic Examination	Clinical Examination	Result of Culture.	Result of *Post-mortem* Examination
1	–.	Suspicious (râles)	Positive	Not then slaughtered.*
2	–.	,,	,,	Tuberculosis, not advanced.
3	? (a.f.b. unlike tuberculosis)	,,	,,	Not advanced (early acute tuberculosis of lungs).
4	–.	Negative	,,	Not advanced.
5	–.	Suspicious (râles)	,,	Not advanced.
6	? (a few a.f.b. very pleomorphic)	,,	,,	Not advanced.
7	–.	,,	,,	Not advanced.
8	–.	,,	,,	Advanced tuberculosis.
9	?.	,,	,,	Advanced tuberculosis.
10	? (atypical a.f.b.)	,,	,,	Tuberculosis not advanced.
11	–.	,,	,,	Tuberculosis not advanced.
12	–.	,,	,,	Advanced tuberculosis.
13	–.	,,	,,	Tuberculosis not advanced.
14	–.	,,	,,	Tuberculosis not advanced.
15	–.	Negative	,,	Tuberculosis not advanced.
16	–.	Suspicious (râles)	,,	Advanced tuberculosis (Tuberculosis Order of 1938).

* Case 1 was not slaughtered at once as expectoration had ceased when the cow was re-examined after the positive cultural result was obtained. The cow was kept under observation for a prolonged period but clinical symptoms and expectoration were in abeyance until 10 months later when tuberculosis developed in the udder. She was then slaughtered and found to be suffering from advanced tuberculosis with old-standing lesions of the lungs. The milk from this cow had been negative to the biological test at the time of the positive culture of sputum.

THE BIOLOGICAL EXAMINATION OF SPUTUM. — Samples of sputum from cows have been submitted to the biological test by inoculation of guinea-pigs only where suspicious clinical symptoms have been associated with very few or atypical acid-fast organisms in the sputum or where large numbers of non-typical and pleomorphic acid-fast organisms have been found in the sputum without any clinical symptoms in the cow.

In the following table details of ten such cases are recorded. Four were submitted because of the scarcity of acid-fast bacilli in sputum from cows showing physical signs suspicious of tubercle (three or less organisms after prolonged search of several slides), a positive result was obtained in three cases and negative in one. Six samples were tested biologically because the organisms, though present in large numbers, were very pleomorphic and mostly non-typical in appearance though some were identical in appearance with tubercle bacilli. It is presumed that the organisms were saprophytes as cultures were not obtained after incubation on egg and ordinary media at 37° C. and negative results followed the biological test. It is of interest that in all six the samples were obtained from the damp wooden walls of the same cowshed.

in extremely small numbers and frequently the sample may appear negative on direct microscopic examination. This may be on account of dilution of the organisms in the purulent discharge, or the fact that in some cases much of the discharge may be derived from the sinus leading to the diseased gland rather than the gland itself. Tuberculosis should, however, be suspected until the sample has been submitted to further tests such as concentration, cultivation or biological examination—which are performed in the same manner as for sputum.

In the direct microscopic examination of pus for tubercle bacilli it may be considered advantageous to use a 1 per cent. solution of picric acid as the counterstain instead of methylene blue in the Ziehl-Neelsen method of staining. By this means one can more easily see tubercle bacilli in the thicker parts of the smear where they would be seen only with difficulty if the counterstain was methylene blue.

In a further case numerous acid-alcohol-fast bacilli morphologically similar to tubercle bacilli were found in an abscess of the brisket. These were not suspected to be tubercle bacilli solely because the nature of the abscess was atypical—the musculature at the seat of involvement appeared to be affected with a dry, dull chestnut-coloured necrosis. Cultural

TABLE III.—BIOLOGICAL TESTS OF SPUTA.

No.	Cow	Result of Microscopic Examination	Result of Biological Test	Remarks
1	—	–. *	–.	* 1 a.f.b. microscopically cultures –.
2	—	–. *	Positive	* 2 a.f.b. microscopically tuberculous on *post-mortem* examination (early lesions).
3	Patricia	? *	–.	* Pleomorphic a.f.b. Cultures –.
4	Lady Lily	? *	–.	* Pleomorphic a.f.b. Cultures –.
5	Daphne	? *	–.	* Pleomorphic a.f.b. Cultures –.
6	Crocus	? *	–.	* Pleomorphic a.f.b. Cultures –.
7	Bluebell	? *	–.	* Pleomorphic a.f.b. Cultures –.
8	Lady Cis.	? *	–.	* Pleomorphic a.f.b. Cultures –.
9	T.16	? *	Positive	* 3 a.f.b. Tuberculous on *post-mortem* examination.
10	—	? *	„	* 2 a.f.b. Confirmed culturally. Tuberculous on *post-mortem* examination.

The Examination of Glandular Discharge

The examination of pus from discharging tuberculous glands (facial, parotid, submaxillary, pharyngeal, prescapular or popliteal, etc.) shows that in the majority of cases in cattle the organisms are present and biological tests of the material were negative and it was concluded that the organisms were non-tuberculous acid-fast bacilli. The lesion subsequently gave place to a purulent discharge from which the organisms seemed to have disappeared.

TABLE IV.—FURTHER TESTS OF PURULENT DISCHARGE.

No.	Source of Sample	Result of Microscopic Examination	Concentration	Cultivation	Biological Examination	*Post-mortem* Examination
1	Facial gland	–.	Not applied	Positive	N.A.	Tuberculosis
2	Facial gland	–.	„	„	„	„
3	Parotid gland	–.	„	„	„	„
4	Popliteal gland	–.	„	Negative	Positive	„
5	Popliteal gland	–.	Positive	N.A.	N.A.	„*
6	Submaxillary gland	–.	„	N.A.	N.A.	„

* Case 5 was not slaughtered as on account of the absence of cough or emaciation it did not come within the scope of the Tuberculosis Order of 1925.

(Abbreviation N.A. = not applied)

The Examination of Uterine Discharge and Vaginal Mucus.

Examination of uterine discharge from cows suspected of being affected with tuberculosis is often the easiest method of obtaining a positive diagnosis as in many instances for some time after generalisation of the disease, expectoration and respiratory symptoms are absent and the lesions in the uterus may develop more rapidly than those in the lungs or udder and the organisms may be extremely numerous in the discharge.

In positive cases the discharge is usually scanty and white, yellowish or golden coloured, though rather transparent rusty-coloured positive samples have been seen. Sometimes the discharge is abundant and clear or slightly milky in appearance with whitish beads of pus. When copious it may be seen on the floor of the cowshed or in smaller quantities on the tip of the vulva or hairs of the tail. Samples may be collected from any of these sources on swabs or, in the absence of any visible discharge, the swab may be rubbed on the inside of the vulva and tubercle bacilli found in the smears made from the vaginal mucus.

The organisms are usually present in immense numbers and the microscopic appearance of positive samples is often typical—the background of mucus being usually of a very fine streaky nature (similar to that seen in the majority of positive bovine sputa). Sometimes oval cells of an epithelioid type are present. When polymorphonuclear leucocytes are present in numbers it is usually an indication of a pyogenic infection; the presence of large numbers of basophile cocci or bacilli also points to a negative diagnosis and suggests septic metritis as the cause of the discharge. Mixed infections may occur but are exceptional.

Of 79 samples of uterine discharge that the writer has examined microscopically for tubercle bacilli, 24 have given a definite positive result, three a doubtful, though probably positive, result and 52 have been negative. The percentage of positives is 30 per cent., but as a number of the cows from which samples were taken were not suspected of being tuberculous and were suffering from post-partum metritis, the percentage of positive samples from suspicious cows only should be considerably higher. In 19 of the positive cases there was during life no other definite evidence of tuberculosis. In two cases a tuberculous uterine discharge was obtained from cows in the seventh and eighth months of pregnancy (in one the foetus was dead and emphysematous). It is probable that in many cases of uterine tuberculosis the last calf born is infected congenitally with tuberculosis as, in fact, a number of foetuses of tuberculous cows show lesions of tuberculosis (sometimes as early as the sixth or seventh months of pregnancy) in the liver, portal, bronchial or mediastinal glands; in some of these (foetal) cases there are no visible lesions of the uterus. As with sputum, particles of dry discharge, which may be obtained from the hairs of the tail, may be examined after soaking out in water. Uterine discharge may be submitted to the same further methods of examination as sputum, namely, concentration, cultivation, or animal inoculation. The examination of uterine discharge or vaginal mucus is the method of choice for the detection of the dam of congenitally infected calves detected in slaughterhouses. It is also of value in some cases in deciding whether a cow affected with tuberculosis of the lungs or udder is worth slaughtering for human food, as if the uterus is infected in addition to the lungs or udder the carcase would usually be condemned as unfit for human consumption.

The Examination of Urine for Tubercle Bacilli.

The microscopic examination of urine for the detection of tuberculosis in cows is recommended only where a diagnosis cannot be obtained otherwise as the examination is tedious and positive results have been obtained in only 12 per cent. of samples from *suspected* cows. In a number of instances where a negative microscopic result has been obtained, the *post-mortem* examination of the animal has shown (usually small) lesions in the kidneys and in some instances the positive result of microscopic examination of urine has probably been at least partly due to contamination with tuberculous uterine discharge. There have, however, been a few cases where very useful information has been obtained by the examination of the urine in the absence of other positive evidence.

In making a positive diagnosis it seems desirable that the acid-alcohol-fast organisms should be typical both in morphology and arrangement and search is made particularly for bacilli in relation to tissue cells. Short acid-alcohol-fast organisms are sometimes met in urine which are of uncertain classification and may be saprophytes.

Of 68 samples of urine examined microscopically for tubercle bacilli, nine samples have proved positive, five gave a doubtful result (at least two of which were probably in reality positive), and 54 a negative result. Other evidence of value has, however, been obtained in some cases by the discovery of masses of cocci and diphtheroid organisms suggesting a diagnosis of pyelo-nephritis, etc.

The Examination of Faeces for Tubercle Bacilli.

The examination of faeces is generally more useful in the differential diagnosis rather than the actual diagnosis of tuberculosis. Thus, in cases of emaciation associated with diarrhoea, microscopic examination of the faeces more frequently reveals the presence of Johne's bacilli than tubercle bacilli, though in a few cases of tuberculous ulceration of the bowels tubercle bacilli have been easily detected in the faeces and recognised on account of their typical morphology and grouping. Johne's bacilli, characterised by their smaller size and typical arrangement in clumps, are sometimes detectable in faeces from cows showing emaciation before the symptom of diarrhoea is established.

The method of examination is to dilute a few cubic centimetres of the faeces with water to a liquid consistency, strain off the coarser debris through muslin or fine wire gauze, and centrifuge the filtered liquid at high revolutions for from 10 to 15 minutes. Smears made from the deposit are stained by the Ziehl-Neelsen technique and examined in the usual manner.

In cases where tuberculous ulcers of the small intestine were present the tubercle bacilli were quite abundant, but in many cases of undoubted Johne's disease the organisms of that disease have not been so easily detected. Tubercle bacilli were detected in

one instance in the faeces of a ten-day-old calf that was being fed on heavily infected milk from the tuberculous udder of its dam. It is presumed that in this case the milk was the source of the bacilli.

SUMMARY

It is shown that the direct microscopic examination of bovine sputum is not conclusive where negative results are obtained and that a considerable increase in the number of positive diagnoses made is obtained by the use of a simple concentration technique or of cultural methods. The biological test is necessary in some cases where acid-fast organisms of a doubtful nature are encountered. Positive diagnoses on direct microscopic examination of bovine expectorate are extremely reliable as shown by abundant *post-mortem* experience.

It is emphasised that microscopic examination of the purulent discharge from tuberculous glandular abscesses frequently gives a negative result. Cultivation of the pus from such abscesses often gives a positive result where no acid-fast bacilli were seen on the direct microscopic examination.

Microscopic examination of uterine discharge is shown to be a valuable method of diagnosis in suspected cows where sputum cannot be obtained for examination and no definite clinical symptoms are present. The organisms are often extremely numerous in positive cases.

The microscopic examination of urine from suspected cows is less satisfactory for diagnosis as in a certain number of cases early tuberculous lesions have been found in the kidney where tubercle bacilli had not been found microscopically in the urine. In some positive cases the urine may have been contaminated by tuberculous uterine discharge.

Acknowledgment.—I am indebted to the late Dr. A. Stanley Griffith, The Field Laboratories, Cambridge, for advice as to the best method for cultivating tubercle bacilli from cattle.

References

[1] Brook, G. B. (1937.) *Vet. Rec.* **49**. 279.
[2] Editorial Article. (1938.) *Brit. Med. J.* 126. (15.1.38.)

Weekly Wisdom

"*. . . it is above all necessary not to be heavy-handed with ideas. It is the function of notions in science to be useful, to be interesting, to be verifiable, and to acquire value from* any one *of these qualities. Scientific notions have little to gain as science from being forced into relation with that formidable abstraction 'general truth.' Any such relation is only too apt to discourage the getting rid of the superseded and the absorption of the new which make up the very metabolism of the mind?*"—Wilfred Trotter. The Commemoration of Great Men. [Collected Papers. Oxford Univ. Press. p. 29.]

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The British Association's Division for the Social and International Relations of Science is arranging meetings to be held, if circumstances allow, on September 26th, 27th and 28th. Subjects under the general heading of "Science and World Order" will be dealt with. The first day's session will take place at the Royal Institution, Albemarle Street, and those of the second and third days, it is hoped, at the Rothamsted Experimental Station, Harpenden.

THE VETERINARY RECORD

September 6th, 1941.

CONTROL OF DISEASE BY THE STATE

THE year 1941 is a milestone in the history of the Bureau of Animal Industry, U.S.A., since the immense task of eradicating bovine tuberculosis seems to be nearing its completion. The most recent report indicates that on January 1st, 1941, every county in the States had become accredited, which means that the total incidence does not exceed 0·4 per cent. This is a noteworthy achievement standing to the credit of the American profession which, led by Melvin, Mohler, Kiernan and Wight, has persevered in this task, year by year, in the face of strong opposition. The difficulties which have been encountered and the manner in which they have been overcome are ably recounted in the book recently published by Dr. Myers, reviewed in this issue.

The co-operative scheme was initiated in 1917 when the number of cattle under test was about 20,000: by 1919, over 300,000 head of cattle had been brought under control and future progress was spectacular. In 1934, Mohler reported that there were 5,753 accredited practitioners listed by the B.A.I. and that practically 10 per cent. of the available veterinarians were devoting their entire energies to tuberculosis eradication work, while in 1939 the number accredited had risen to 11,185. It may be noted that a large proportion of the testing has been undertaken by private practitioners, under the control of the Bureau. Kiernan publicly asserted that "the Bureau has endeavoured to enlist the services of every qualified veterinarian in America in the campaign of tuberculosis eradication" and quoted a specific regulation providing that in the case of cattle transferred between different States practically all the testing should be done by private veterinarians.

The activities of the Bureau have also extended into other fields. In some instances highly encouraging results have been achieved, as, for example, the control of Texas fever by the eradication of the tick. This campaign was started in 1904 and has proved most arduous, but it is estimated that at the present time over 99 per cent. of the original infected areas have been freed from Federal quarantine.

Nevertheless, all diseases do not lend themselves so readily to bureaucratic control. Twenty-six years have passed since Dorset and his co-workers prepared anti-swine fever serum and disclosed the method of simultaneous vaccination. Each year enormous quantities of these products have been released under Federal licence: for example, in 1938, 741,000 litres of serum and 210,000 litres of virus were issued. Undoubtedly large sums have been saved annually by the use of serum; at the

same time a significant reduction in the incidence of the disease does not appear to have been secured. The introduction of crystal violet vaccine is an indication of the comparative failure of the serum-virus policy. The control of contagious abortion has also figured in the activities of the Bureau and a co-operative campaign against the disease by the application of the agglutination test and the slaughter of reactors was adopted in 1934 and has been broadly accepted. Nevertheless, Mohler has pointed out that other methods of controlling the disease must not be ignored. He says, "Much progress has been made in the control and eradication of Bang's disease in cattle in this country, through the co-operative work conducted under the provisions of the test-and-slaughter plan since July, 1934. The provisions of this plan will undoubtedly be continued in the future, but the Bureau is prepared to approve a suitable plan that will incorporate the vaccination of calves at the proper age as an adjunct to it." We may add that the slaughter policy for 1940 cost nearly $7,500,000.

The results obtained by our American colleagues have been reviewed in order that we may ask ourselves whether similar methods could be applied with equal success to the bovine population of this country. Considerable interest has been aroused in the feasibility of seizing the opportunity afforded by the compulsory reduction of cattle, to accelerate the efforts which have already been made to diminish the incidence of the more important diseases, and many believe that the time is ripe for a wide-spread drive. We cannot enter into all the different aspects of this question, but attention may be directed to the underlying principles which have guided the B.A.I. in regard to tuberculosis. Firstly, the Bureau recognised from the start that any scheme was bound to fail unless adequate encouragement was given to the farmer by fair compensation for reacting cattle removed from his herd. In the beginning, the amount required was small and in 1917 was only $75,000, but it increased each year at a startling rate. The second factor of importance was the comparatively low initial incidence of tuberculosis which was estimated at not more than 5 per cent. A reduction to less than 0·5 per cent. *has* been effected, but it has taken 25 years of intensive work and has entailed an expenditure in administration and compensation of $260,000,000, during the period 1917-41.

It is obvious that the implementing of a similar plan in this country would be a formidable undertaking requiring a bold and imaginative outlook. Our colleagues of the Ministry of Agriculture have already made a start, but without in any way detracting from their efforts, we may venture to suggest that rapid progress is scarcely possible without the support of a much more comprehensive and liberal attitude in regard to the disbursements which are essential for the successful prosecution of schemes of this nature. The necessary machinery is available, but judging from the experience of the U.S.A. authorities, there seems to be no escape from the conclusion that piecemeal measures are fraught with a grave risk of disappointment, if not of complete failure, with resulting dissatisfaction to the farming community.

It is only too apparent that, in the past, the lack of a forceful policy has been responsible for setbacks in the attempted control of important diseases in this country. The fault does not lie with the veterinary profession, which has always been prepared to play its part, but in the failure of the appropriate Government Departments to recognise the false economy engendered by the sponsoring of schemes which have received inadequate financial support.

REVIEW

[MAN'S GREATEST VICTORY OVER TUBERCULOSIS. By J. Arthur Myers, Ph.D., M.D., F.A.C.P. (Pp. 419; illustrated. $5.00 post paid or £1 7s. 6d.) Baltimore: Charles C. Thomas; London: Baillière, Tindall and Cox. 1941.]

There are many admirable text-books dealing with different aspects of tuberculous infection in man and animals but few which give to the reader a broad picture of the difficult task which confronts the medical and veterinary professions in their respective spheres of activity. Dr. Myers, who has obviously been in close touch with veterinarians, has endeavoured with success to bridge the gap. One of the main objects of his book is to survey the achievements which the veterinary profession can rightly claim as a permanent contribution to the control of tuberculosis, and to arouse the interest of physicians and public health officers in the control of the human disease. The book however goes further than this; indeed, the first eight chapters are a history in miniature of the rise of the veterinary profession in the U.S.A.

The beginnings of veterinary schools and journals are traced from the courses of lectures in veterinary medicine given in 1846 by Robert Jennings followed by the organisation in 1850 of a veterinary college in Philadelphia, to the present position in which the veterinarian is regarded as one of the best educated men in his community. These early chapters can be particularly recommended to those who are interested in the origins of the American organisations. The author takes the somewhat unusual course of depicting the development of the profession by selecting outstanding personalities and recounting their influence on the advancement of veterinary science. The delightful studies of such well-known veterinarians as James Law, V. A. Moore, E. C. Schroeder, M. Dorset, C. P. Fitch and others will be read with appreciation. There is also a full account of the initial difficulties of the pioneers in Veterinary State Medicine and their constant struggle with ignorance, prejudice and vested interests. One of the outstanding achievements has been the establishment of the Bureau of Animal Industry and full recognition is accorded to the sound foundations laid by D. E. Salmon, A. D. Melvin, J. R. Mohler, and others. The activities of the Bureau in controlling bovine tuberculosis and the triumph which has rewarded its efforts are particularly stressed. The most recent charts published by

the Bureau show that the incidence of bovine tuberculosis throughout the whole country has now been reduced to less than 0·2 per cent., implying that the whole of the cattle population is now accredited. Dr. Myers points out that the steps which have led to this state of affairs have been laborious, but that the greatest credit is due to the broad vision of Dr. J. Mohler and his predecessors for the sound planning of the tuberculosis eradication scheme, and to the veterinary profession for its execution.

It is natural that a book dealing with the ceaseless fight against animal diseases in the U.S.A. should tend to accentuate the discoveries made in that country: at the same time, the opinion may be ventured that workers in European countries have been equally aware of current problems and have made important contributions towards their solution. For example, it is a little surprising that no recognition is given to the investigations of M'Fadyean on glanders and on the tuberculin test in cattle, of Theiler on the pathology of various insect-transmitted diseases in Africa, and so on; surely these investigations rank in importance with those of Smith and Kilborne on Texas fever, and of Dorset on swine fever. There is a short section on the value of B C G for the immunisation of cattle. The evidence cited is culled solely from American and Canadian sources and the conclusion is reached that vaccination with B C G, and indeed all methods of immunisation, can be completely discarded. It is doubtful whether responsible workers in Europe would agree with this sweeping conclusion.

This book will provide much valuable material for members of the profession, both in an official and in a private capacity, who are striving to improve the health of livestock in this country.

Figures as to the incidence of bovine tuberculosis in Kent, considered by the county agricultural committee, show that there has been a considerable increase in the number of cattle examined and a marked decrease in the proportion of cows slaughtered. Altogether, 55,520 examinations of cattle were made in 1937, and 84,339 in 1940. The number of cows slaughtered per 1,000 cows examined was: 8·86 in 1937, 7·05 in 1938, 4·36 in 1939, and 3·41 in 1940.

* * * * *

To encourage the winter feeding of sheep on arable land the Government have decided on an addition of 1d. per pound to the prices for first-grade sheep and lambs and second-grade lambs for six months from the middle of November, with consequential adjustments at the beginning and end of the period.

* * * * *

There has been a good deal of talk about farmers giving up their dairy herds and turning over entirely to arable farming and corn-growing. The great majority of milk-producers are likely to keep to the job that they understand. The average herd of cows in this country does not number more than 20, and the typical small dairy farm is not suited to corn-growing on an economical scale. While the farmer has ploughed up perhaps ten acres to grow oats and roots for his cows, his main income is derived from milk, and if he knows where he stands about prices he will remain loyal to his cows.—*The Times.*

ABSTRACTS

[CUTANEOUS REACTIVITY TO TUBERCULIN IN THE DOG. Mills, M. A., and Colwell, Charlotte A. (1937.) *Proc. Soc. exp. Biol.* **37**. 470-473.]

It is generally considered that the tuberculin test in the dog is unreliable, and this opinion appears to be based mainly on the work of Cobbett and Griffith, published in 1913 in the Report of the Royal Commission on Tuberculosis. The present paper gives the results of intradermal tuberculin tests on 30 normal dogs and 45 dogs experimentally infected with virulent tubercle bacilli (human and bovine) by intrabronchial administration.

The tests were made on shaved areas of the skin of the neck and upper portions of the hindquarters after thorough cleansing with soap and water and alcohol. "Old Tuberculin" (Parke Davis) and Purified Protein Derivative (P.P.D., Seibert) were injected intracutaneously in amounts of 0·1 c.c. The tuberculins were diluted with normal saline, the usual dilution being 1 : 100. Readings were made at 24, 48 and 72 hours and the readings at 48 hours were graded as follows:—

Slight redness without oedema ...	—
Slight redness with oedema less than 5 mm.	?
Oedema measuring 5 to 10 mm.	+
,, ,, 10 to 20 mm.	++
,, ,, 20 to 30 mm.	+++

The results in all 30 normal dogs were uniformly negative. Of the 45 experimentally infected dogs, 42 gave a definite positive reaction. Three dogs gave doubtful or negative reactions: one of these showed no gross lesions of tuberculosis at autopsy and the other two were still alive at the time of writing the paper. It is of interest that several dogs which were at one time positive to the test gave doubtful or negative reactions one to three months before death, suggesting that advanced tuberculosis is accompanied by desensitisation. Apart from this there was no obvious correlation between the degree of cutaneous sensitivity and the extent of the tuberculous lesions. The positive reactions ranged from "+" to "++" or "+++" in all cases and the animals which gave the most marked reactions usually reacted when tested with a 1 : 1000 dilution, and some even with a dilution of 1 : 10,000.

[These results suggest that the intracutaneous test might well be given a trial in dogs suspected of being tuberculous, although it is likely to prove unreliable in rapidly progressive or advanced cases. A useful practical suggestion is that the site of the injection should be ringed with a skin pencil when the animal's skin is heavily pigmented as this makes subsequent readings much easier.]

E. G. W.

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[FURTHER STUDIES ON CANINE ENCEPHALITIS. Bechman, C. H., and Torrey, J. P. (1941.) *N. Amer. Vet.* **22**. 39-46.]

Experimentally, the symptoms include a transient rise in temperature, a watery discharge from the eyes, congestion of the membrana nictitans and sclera, cloudiness of the aqueous humour and constriction of the pupil, often to a pin point, involving progressive

loss of reflexes to light. Some animals become comatose and are roused only by handling while others are restless and excitable. Convulsions occur more frequently in younger dogs and resemble those seen in strychnine poisoning. In the early stages the condition is difficult to distinguish from distemper while the dumb form of rabies is often confused with the comatose condition of canine encephalitis. If the animal survives the initial stages, chorea, blindness or paralysis of the jaw or limbs may occur. Symptoms are usually not observed by owners until convulsions, locomotory disturbances or other nervous symptoms develop.

The use of ice packs or puncture of the cisterna gives relief in cases of acute cranial pain due to distension of the ventricles of the brain and the subarachnoid spaces. Experimentally, the use of anti-canine serum proves effective if administered early.

A. T. P.

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[RADIOACTIVE IRON AND ITS METABOLISM IN ANAEMIA. Hahn, P. F., Bale, W. F., Lawrence, E. O., Whimple, G. H. (1939.) *J. Exp. Med.* **69.** 739-753. (1 fig., 2 tables, 12 refs.).]

The production of radio-active isotropes has opened the way to a more exact study of the metabolism of minerals in the body. The radio-active isotropes are "marked," but behave exactly as their inactive replicas in the body. They can be easily recognised, however, and an assurance given that the mineral detected in bones, tissues, and fluids is that which was experimentally introduced and not some other arising from body storage depots.

Preliminary observations on radio-active iron and its metabolism in anaemia in dogs are recorded. The agent was found to be extremely sensitive and lent itself to studies of absorption, mobilisation and excretion. The life of the iron used was amply long for experimental purposes (half life = 47 days). It was found that in the dog the need of the body qualifies the amount of iron absorbed. In anaemia large amounts are assimilated, but in the normal state very little is necessary. The plasma is clearly demonstrated to be the means of transport from the intestine to the erythrocyte. Iron is absorbed and transferred with great speed. The importance of liver and bone marrow in iron metabolism is confirmed.

D. D. O.

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[STUDIES ON EXPERIMENTAL HYPERTENSION. XIV.—THE EFFECT OF INTERMITTENT REN L ARTERIAL OCCLUSION ON THE BLOOD PRESSURE OF THE DOG. Goldblatt, H., Weinstein, H., and Kahn, J. R. (1941). *J. exp. Med.* **73.** 439.]

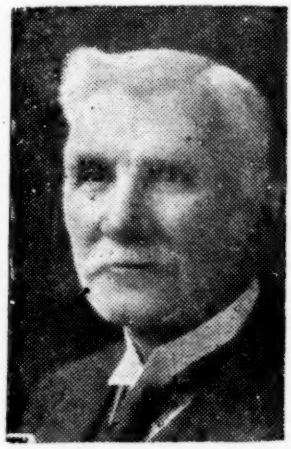
It was found possible to produce intermittent occlusion of the renal arteries by means of a silver ring placed round the artery and attached to a silver chain which was brought to the exterior. Although occlusion was carried out for 30 minutes daily for five months, no effect on the blood pressure was noted. However, if the occlusion was made persistent, hypertension and renal insufficiency quickly developed, the kidney showing parenchymatous degeneration and necrosis.

J. A. N.

MEMOIR

Major F. L. Gooch, J.P., T.D., F.R.C.V.S.

With the passing of Frederick Leeds Gooch, of Stamford, recorded with deep regret in our last issue, the profession has lost a typical practitioner of the old régime. He qualified at the age of 21 in 1880 as a graduate of the Royal Veterinary College, London. He was then resident in Weston Longville, near Norwich, but within a year he had set up in Stamford, taking over the old-established Wattam practice, and the whole of his professional life of 60 years was spent in that town. Among his fellow students graduating at the same time as himself were T. W. Cave, T. W. Lepper and Sidney Villar. Of his contemporaries he was, however, the first to take the Fellowship Diploma, which he did in 1886, at the same time as such stalwarts as Professor Penberthy, John Malcolm, Finlay Dun, Andrew Smith of the Ontario Veterinary College, Joshua Nunn of the Army Veterinary Department, James Macqueen, William Woods, and William Williams of the new Veterinary College, Edinburgh. It was amongst such men as these that the young man of 27, with his high order of intelligence, his studious nature, and his zeal for his profession, justly ranged himself. From the beginning of his career he took an active part in every veterinary activity that offered itself. He joined the local veterinary associations, and an annual conference would not have been felt to be complete without the presence of Major Gooch. He did not often contribute to veterinary literature, but he never failed to take part in the discussions at any meeting he attended. He was one of the original members of the Council of the N.V.M.A. on its incorporation, and was Vice-President in 1931-32. In 1938 he was elected an Honorary Life Member of the Association at the Congress held at Glasgow. On that occasion he mentioned that from his infancy he had been interested in the profession, and that he assisted his father at the age of 9 to perform an "operation," because it was one which required small hands. He spoke of himself as being perhaps the only member alive who could remember seeing a case of cattle plague.



Major Gooch was most assiduous in attending the annual meetings of the College, and he made several valuable presentations to the College library. When the appeal was made for funds for the rebuilding of the Royal Veterinary College, Major Gooch organised several functions for the purpose of collecting money, and from one such effort he was able to send in a cheque for £150. He was a member of the Council of the National Veterinary Benevolent and Mutual Defence Society, and for over 30 years a member of the Council of the Victoria Veterinary Benevolent Fund, taking the keenest possible interest in the work of both societies.

Throughout his long life Major Gooch was always modern in his ideas. He sought the company of young members of the veterinary profession, and constant in discussion of new forms of treatment, he kept abreast of the times by his reading on all veterinary matters.

There was no more assiduous attender of Veterinary Association meetings. He was one of the best supporters of the Midland Counties Association and the Eastern Counties Association. Although getting on in years he always appeared young and energetic in his ways, and he recognised no age limit for any form of service.

Major Gooch was a man of keen powers of observation, great industry and sound judgment. Endowed with an excellent memory, and a good critical faculty, he profited by every incident in his experience. His reputation, both personal and professional, never suffered any tarnish. A man of high principles, he was deeply attached to his own religious denomination, which he served in many capacities, from Sunday School teacher to local preacher. Indeed there were few activities in the public life of his town and county in which he did not share, from membership of the local volunteer fire brigade to Justice of the Peace.

In the ancient town of Stamford he was a well-known figure for the past 60 years, where his public-spirited qualities were appreciated. From the time he was a young man, participating in all the sporting activities of the town, he was always looked upon as being "a man of Stamford," and even at the meetings of the Town Council a special seat was reserved for him, as he sat at all Council meetings in an advisory capacity in connection with the working of the Diseases of Animals Acts, etc.

He acted as Local Veterinary Inspector of the Ministry of Agriculture and Fisheries for many years; he was for some time on the Board of Examiners of the Royal College of Veterinary Surgeons. Being of an inventive turn of mind, he devised several special instruments for use in his practice: many of these instruments he exhibited at the Annual Congress held at Yarmouth in 1939, and they proved a great source of interest to the young practitioners, who keenly examined them.

He was a well-known man in the Shire horse world. For many years he acted as a Veterinary Inspector at the Annual Show of the Shire Horse Society, as also in connection with the Royal Show: in his attendance as an official at the latter event, spread over so many years, he became well known to pedigree stock breeders all over the British Isles.

Major Gooch was also prominent in Masonic circles, being the oldest surviving member of the Stamford Merit Lodge and taking provincial honours over half-a-century ago. He twice passed through the chair of the Merit Lodge—in 1889 and again 48 years later. A Past Provincial Grand Warden, he took provincial honours as Pursuivant only three years after his entry in Freemasonry, at a time when there were but eight lodges and three chapters in the province of Northants and Hunts, with which Merit Lodge is associated.

Major Gooch was also the oldest member but one of the Masters' Lodge, Northampton, of which he was founder, and through the chair of which he passed in 1917. He was also a founder of the Peterborough and Counties Lodge, and had served stewardships in all three of the charities of the Order and held the charity jewel.

In Mark Master Masonry, Major Gooch took no part, but he passed through the chair of the Montagu Chapter of Royal Arch Masons and held three provincial offices.

As a sportsman, Major Gooch was widely known in his younger days as a cricketer, a footballer and as a lacrosse player. A wicket keeper of some talent, he played for Burghley Park Cricket Club in the halcyon days of the club, and could recall the tme when the great W. G. Grace visited Stamford. Indeed, Major Gooch was the last surviving member of the club's team which played in 1880, and he preserved in his possession some of the club's earliest scorebooks. He also played for the Stamford Commercial C.C., but it was the Park Club which claimed his chief interest, and he took a leading part in the provision of the present pavilion early in the present century. He retained his interest in the club to the end, continuing to hold a seat on the committee until the club's activities were suspended through the outbreak of war.

In his younger days, too, Major Gooch played for the old Stamford Rugby Football Club as well as for the town association team, and he was a member and captain of the Stamford Lacrosse Club, which enjoyed several seasons' good sport. He was also exceedingly fond of skating, swimming, and as a member of the old Stamford Literary and Scientific Institute he played for its chess and draughts club.

In the days of the old Volunteers and the early days of the Territorial Army, Major Gooch served his country for a quarter-of-a-century. He enlisted in the Stamford D Company, 2nd Lincs, in 1889. In 1897 he was made lieutenant and quartermaster; ten years later he became captain and quartermaster; and in 1912 he was promoted to the rank of major and quartermaster. When the Territorial Army took the place of the Volunteers at the beginning of the century, the three Lincolnshire battalions were remodelled into two, and Major Gooch became supernumerary officer of the 4th Battalion, but acted in the capacity of quartermaster to the 5th Battalion, which had its headquarters at Grimsby, until he relinquished his commission in 1913.

As a member of the Stamford Rifle Club and of the Volunteers, Major Gooch gained considerable success as a marksman. He won the battalion recruits prize in his first year and in the second year he became a marksman. He took a leading part in the acquisition in 1896 of the Tinwell Butts, still used by the Stamford Territorials, acting as secretary to a gigantic bazaar which went far towards raising the necessary funds.

Major Gooch's shooting experience was gained chiefly with the old Martini rifle with which he won several prizes in connection with the Lincs Rifle Association, and for several years he went to Bisley, carrying off a first prize the first year it was open.

He developed gardening as a hobby and possessed a very wide knowledge of horticulture.

Major Gooch, whose health had been failing for the past two or three years, leaves a daughter and two sons, to whom, on behalf of the profession as a whole, we extend our sincere sympathy.

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The Funeral

Civic, masonic, professional and agricultural representatives were among the large attendance of sympathisers who attended a service at the Stamford Methodist church, on the afternoon of Monday, August 25th, which preceded the interment at the cemetery.

The superintendent minister (the Rev. W. E. Garman) officiated, and in the course of a brief address, made special reference to Major Gooch's work for Methodist overseas missions, which, he said, was perhaps better known outside Stamford than in the town. Through his attendance at the annual conference of the Laymen's Missionary Union at Swanwick, at which he always organised the afternoon sports, Mr. Gooch was brought into touch with missionaries from all over the world and with laymen from all parts of the country.

Mr. Gooch, said Mr. Garman, not only loved his church and loved and served the town in which he lived, but was loyal to the uttermost to the call of the Master—"Go ye and make disciples of all the nations."

The family mourners were Mr. and Mrs. H. C. L. Gooch, Glasgow, and Mr. and Mrs. F. W. L. Gooch (sons and daughters-in-law), Miss M. Gooch (daughter), Mr. S. L. Gooch, Holt, Norfolk (brother), Miss Laura Gooch, Bedford, and Mrs. Cresswell, Marple (nieces), Mr. W. C. White, Spalding, and Mr. T. Hicks, M.R.C.V.S., Sleaford (friends).

Civic representatives present included the Mayor (Alderman H. Deer), Aldermen E. S. Bowman, J. S. Prior and A. F. Denning; Councillors E. Ireson, Mrs. Scholes, H. J. B. Niblett, T. H. Dickinson, J. S. Phillips, C. H. Jones, J. W. Scotney, W. E. Dodman, A. S. Hunt, C. Prestwood and L. Thomas, the Town Clerk (Mr. H. Baldwin), the Borough Surveyor (Mr. F. R. Ryman), and the Medical Officer of Health (Dr. W. A. Hawes).

Freemasonry was largely represented and others present included the Marquess of Exeter, K.G., and the following members of the veterinary profession: Mr. W. Gibson, Grantham (representing the National Veterinary Medical Association of Great Britain and Ireland, Mr. G. Lockwood, Peterborough, President, Mr. J. H. Poles, Whittlesay, Vice-President (representing—with Mr. W. Gibson, Secretary—the Lincolnshire and District Veterinary Medical Association), Mr. W. Townson, Peterborough, and Mr. George Gibson, Oakham.

The many lovely wreaths included tributes from the Mayor, aldermen, councillors and officials of the borough of Stamford; the President and members of the Council of the National Veterinary Medical Association; the President and members of the Midland Counties Veterinary Association, and the members of the Lincolnshire and District Veterinary Medical Association.

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Country Practice in the Heyday of the Horse

The Late Major Gooch in Reminiscent Mood

[Contributed]

We are glad to have the opportunity of publishing, in association with the foregoing notice, the following contribution from a journalist friend of Major Gooch, resident in Stamford. Based on extracts from notes of an interview in 1937, it will, we feel, be read with special interest as presenting a vivid picture of the life of the practising veterinarian while the horse was still both the mainstay of practice and almost the sole means of case visitation.

Few veterinary surgeons can have seen more changes in the profession and the means of carrying on a practice than Major Frederick Leeds Gooch, F.R.C.V.S. The accompanying picture depicts Major Gooch ready to set out on a day's work in the early 'eighties. At the time he kept four horses and two ponies, and each animal used to average 30 miles a day.

Each alternative day, however, was a rest day. A horse that worked on a Monday, for instance, did not turn out on a Tuesday. On one occasion Major Gooch drove and rode a horse 55 miles on one day, and on that day covered altogether 78 miles on horseback or by trap. What a feat in those days; now little more than a couple of hours' driving. Then it was considered a good journey to visit a point ten miles away and return home.

The veterinary surgeon, of course, had then, as now, to be out in all weathers, and on one occasion—the only occasion in his life—Major Gooch "took" a hedge in a horse and trap. He was on his way to Empingham (Rutland) in deep snow—in fact the flakes had drifted eight to ten feet deep in some parts. To get to his destination, Major Gooch had to cross some fields, and in making their way through the drifts of snow the horse and trap passed over a fence! While making another visit on horseback at this time, Major Gooch was galloping merrily along, when he and his horse disappeared in a ditch, which, of course, was filled with snow and gave no indication of its presence.

Another incident—and one which reveals the instinct of our equine friends—occurred one exceptionally foggy night when Major Gooch was on his way to Painton (Northants). Suddenly the horse stopped dead in the middle of the road and nothing could induce it to go a step further. On dismounting to investigate, Major Gooch found a couple of ponies lying across the centre of the road, apparently for a rest! A particularly unpleasant experience befell him on one occasion on the Great North Road at two o'clock in the morning. As he was turning into the Great North Road, the wheel of his trap struck a large stone which had got moved into the roadway, with the result that the trap overturned, throwing him out with some force. Fortunately, the horse stood still and, by a piece of luck, two poachers appeared on the scene and gave Major Gooch a hand in setting the trap to rights and he was able to proceed home. "That is the only time I had known poachers to help anyone," Major Gooch told me. In the very hard winters, by the way, he often travelled by sledge and, of course, he made some use of trains.

As a Methodist local preacher, Major Gooch often combined those duties with his professional work and more than once he had walked ten miles or so home after a service at which he had preached after attending a cow or some other patient.

Then came the dawn of the petrol age, and the first car in which Major Gooch rode was an Orient, which was steered by a lever. One of Major Gooch's earliest motoring experiences was when he was taken to Cowbit Wash, picking up *en route* a Crowland veterinary surgeon. Starting early one morning, they reached Crowland by 7 a.m. and proceeded to Cowbit Wash, the two veterinary surgeons occupying the back seat. On the return journey, however, Major Gooch sat with the driver, and when the Crowland veterinary surgeon, who had sat alone at the rear, reached home, he was as white as death and observed as he alighted, "Thank God I am on terra firma. I shall never go in a car again. I expected to see the car at the bottom of the dyke and me with it." The first car Major Gooch drove was a six h.p. Rover, which was most difficult to steer.

On each occasion that a country agricultural show was held in Stamford in his time Major Gooch acted as veterinary officer. When the Northamptonshire show visited Stamford in 1886, the exhibits included a Shorthorn bull named Rum and Milk, belonging to Mr. Richardson, of the Royal Hotel, Kettering. This animal was taken ill during its stay at Stamford and was attended by Major Gooch, who, as one of the Society's officials, was unable to accept payment for his services. On his following birthday, however, Major Gooch received from the grateful owner a silver matchbox, which he kept to the day of his death, bearing the inscription "Rum and Milk, 1886." The visit of the Lincolnshire Society was the occasion of some misfortune, there being an outbreak of disease, more particularly among the hunters, due to the eating of heated clover, and one valuable first-prize winner belonging to Mr. J. H. Stokes, of Market Harborough, died. The affected animals were housed in different stables in the town, and Major Gooch, who, again, was one of the official veterinary surgeons, was kept busy visiting all parts of the town attending to his patients.

In addition to this, however, Major Gooch was at that time a member of the Stamford Volunteer Fire Brigade, and when he had finished his professional work he had to take his turn of duty as a fireman on the showground, with the result that in that memorable week he did not see his bed from Tuesday morning until Saturday night.

But even the nature of the work has changed. One realises, of course, that the number of horses has decreased tremendously, but how few realise that in the 'eighties and even later few people thought of taking their dogs, cats, rabbits or fowl to the veterinary surgeon. Such pets were generally left to the mercies and limited knowledge of keepers, and it was seldom that a veterinary surgeon had one of the smaller types of animals to attend.

In addition, of course, the passing of public health acts and orders has brought with it a tremendous amount of inspection work that was unthought of in Major Gooch's younger days, but all this has helped to counteract the shrinkage which would otherwise have taken place in veterinary work consequent upon the decline of the equine population.

In the early days of Major Gooch's professional activities one Stamford hire firm alone kept between 30 and 40 horses and three days a week during the season sent out as many as a dozen hunters. In addition, many such animals were privately owned, but nowadays not a single hunter is left in the town. Farmers visited the market in horse and traps, and anything up to 30 carriers' carts visited Stamford on market days. All of these have now disappeared.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Sept. 10th.—Meeting of the West of Scotland Division, N.V.M.A., at Glasgow, 2.30 p.m.

Sept. 12th.—**59th Annual General Meeting of the National Veterinary Medical Association of Great Britain and Ireland,** in the Connaught Rooms, Great Queen Street, Kingsway, W.C.2, at 2.30 p.m. A luncheon will be held at the Connaught Rooms at 1.15 p.m., cocktails 12.45.

Tenth Annual General Meeting of the V.V.V.B. Ladies' Guild, in the Connaught Rooms, Great Queen Street, W.C.2, at 12 noon.

Sept. 17th.—Meeting of the Western Counties Division, N.V.M.A., at Guildhall, Exeter, 2 p.m.

Sept. 19th.—Meeting of the Lancashire Division, N.V.M.A., at the Victoria and Station Hotel, Preston, 2.15 p.m.

Meeting of the Mid-West Division, N.V.M.A., at Bath.

Sept. 20th.—Entries for Miss Aleen Cust Veterinary Research Scholarship (R.C.V.S.).

Oct. 6th.—R.C.V.S. Committee Meetings, Royal Station Hotel, York.

Oct. 7th.—R.C.V.S. Committee Meetings, Royal Station Hotel, York.

Oct. 8th.—R.C.V.S. Council Meetings, Royal Station Hotel, York.

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N.V.M.A. Annual Meeting: Luncheon

As intimated in our last issue, the Annual General Meeting of the National Veterinary Medical Association, to be held at the Connaught Rooms, Kingsway, on Friday, September 12th, will be preceded by a luncheon at 1.15 p.m. (cocktails 12.45). Owing to the difficulties of catering, would members who intend to be present at the luncheon please notify the General Secretary, N.V.M.A., at 10, Bore Street, Lichfield, by Monday next, sending remittance for tickets at 6s. 6d. each.

PERSONAL

Marriages. — Brownie — Billinghurst. — On August 23rd, 1941, at St. Augustine's Presbyterian Church, New Barnet, William Best Brownie, elder son of Mr. and Mrs. M. B. Brownie, 64, Restalrig Road, Leith, Edinburgh, to Ella, only daughter of Mr. and Mrs. P. J. Billinghurst, 60, Audley Road, Hendon, N.W.4.

Donnelly—O'Connor.—On June 11th, 1941, at the Church of the Sacred Heart, Donnybrook (with Nuptial Mass), by the Very Rev. Monsignor Molony, P.P., LL.D., assisted by the Rev. J. J. Matthews, C.C., Donnybrook, and Rev. P. Drake, Adm., St. Mary's, Navan; Alan, eldest son of Mr. Andrew Donnelly, M.R.C.V.S., and Mrs. Donnelly, Harpur House, Drogheda, to Eileen, only daughter of Professor J. J. O'Connor, M.R.C.V.S., and Mrs. O'Connor, Morehampton Road, Dublin.

Ricks—Evans.—The marriage took place on Sunday, August 10th, at St. James's Church, Weybridge, Surrey, between Olive Winifred Ricks, M.R.C.V.S., daughter of Mr. and Mrs. P. H. Ricks, of Brooklands Farm, Weybridge, Surrey, and Kenneth Guy Douglas Evans, M.R.C.V.S., son of Mrs. M. Moncrieff, of Lauriston, Wych Hill, Woking.

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R.C.V.S. OBITUARY

McLaren, Frederic Donald, Logue House, Norwood, Beverley, Yorks. Graduated N. Edinburgh, December 17th, 1889. Fellowship May 28th, 1895. Died August 25th, 1941; aged 72 years.

Morgan, Edward, Llwyn House, Machynlleth, Montgomery. Graduated London, May 16th, 1890. Died August 15th, 1941; aged 74 years.

Mr. E. Morgan: London Freeman

By the passing of Mr. Edward Morgan, M.R.C.V.S., the Dovey Valley loses (says *The Cambrian Times*) a forceful personality and one who was generally recognised as an original character. The notice proceeds: "A native of Machynlleth, deceased practised in his early days at Folkestone, but shortly after the outbreak of the Boer War relinquished this work to take a commission in H.M. Forces as veterinary officer to the Horse Artillery. Devoted to animals and heedless of personal risk, he distinguished himself in the South African campaign, and was mentioned in dispatches by Lord Roberts. On his return to this country he was one of those who were honoured with the Freedom of the City of London.

"On his return to Machynlleth, Mr. Morgan established the successful practice which he carried on in the Dovey Valley for over 30 years. Bluff of manner and with a gift for quick repartee, he was a man who detested all forms of humbug. Practically every farmer and homesteader for miles around knew and respected him. In Machynlleth, he took an interest in various public movements, and was a director of the local gas company.

"A staunch churchman, deceased was deeply attached to the Parish Church. One of his hobbies was the study of ecclesiastical law, and he was reputed among laymen and even the clergy as being something of an authority. Mr. Morgan was a nephew of the founder of the Edward Morgan scholarships."

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Mr. F. D. McLaren, F.R.C.V.S.

Mr. Frederick Donald McLaren, whose death we record above with much regret, was a native of Beverley, Yorks. In a tribute, *The Beverley Guardian* observes: "Mr. McLaren, who was of a quiet and retiring nature, was extremely conscientious and lived for his work. When he left college he was for five years veterinary surgeon for the late Sir Richard Cory, one of the largest colliery owners in Wales, and when his father died he decided to come home to Beverley and carry on the business which his father had carried on before him.

"He has been veterinarian for the Ministry of Agriculture and has carried out the meat inspection in Beverley for over 40 years, and he has held numerous

other positions in and around Beverley. He was well-known at all the cattle markets in the district, and had a very extensive practice until recent years."

Mr. McLaren was a bachelor.

The funeral took place at St. Mary's Cemetery, Beverley, on August 28th. The Rev. J. W. Woolgar conducted the service, and among those present were Mr. J. Dennett (Town Clerk of Beverley), also representing the Mayor, Councillor Arthur Watts, Mr. E. Varley, M.R.C.V.S. (Divisional Inspector, Animal Health Division, Ministry of Agriculture and Fisheries), Mr. F. Bradley, M.R.C.V.S. (Hessle), Mr. J. W. Procter, M.R.C.V.S. (York) (also representing Mr. Barker, M.R.C.V.S., Nelson), Mr. J. J. Ridley. M.R.C.V.S. (Beverley) and Mrs. W. B. Huzzard (representing Mr. W. B. Huzzard, Chairman of Beverley R.D.C.).

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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THE SCHEME OF THE SURVEY COMMITTEE OF THE N.V.M.A.

To the Editor of the Veterinary Record

Sir,—As the time has now come for the Survey Scheme to go before Divisions for acceptance or rejection, I ask practitioners to consider the matter most carefully before they harness themselves to a scheme which, in its present form, may end in disappointment to themselves and leave the agricultural community in no better case than it is to-day.

The supplement to *The Veterinary Record* published on August 30th contains a summary of divisional criticisms, and I therefore do not propose to write at length on this subject. I believe that the scheme is doomed to failure for the following reasons:—

(1) It is voluntary.

(2) While it has the support of the officials of the Farmers' Union, it is unlikely to receive much support from the farmers generally.

(3) The economic factor looms large when eradication or control of disease on the farm is considered and farmers will be unlikely to attempt to deal with disease other than that causing them obvious financial loss. Any attempt to eradicate tuberculosis, mastitis, contagious abortion, etc., on any farm simultaneously is impractical.

(4) The chaotic state of affairs in connection with tuberculin testing has caused the profession much loss of "face," and made the farmer even more averse to bureaucratic control.

(5) To the disadvantages common to any panel scheme must be added the further handicap of a voluntary basis.

(6) On page 117 of the supplement there is a suggested form of undertaking, part of which reads as follows:—

"The veterinary surgeon will visit and carry out an examination of the herd (*i.e.*, all female animals over the age of six months, and bulls) regularly every three months, and *will make such other visits as may be necessary* for the purpose of controlling contagious abortion, sterility, mastitis and Johne's disease in the herd in accordance with the methods of treatment specified in Memorandum 000 issued by the Ministry of Agriculture and Fisheries."

I hope practitioners will realise the amount of work involved, and the number of visits it may be necessary to make in order to do this work as it should be done. It will certainly necessitate additional help and additional equipment, including motor cars. The last subject one wishes to introduce is the financial aspect, but few veterinary surgeons are lucky enough to have private means and cannot work at a loss.

The suggested charge of 4d. per mile for any mileage in excess of ten miles each way necessarily travelled on the occasion of each visit is absurd.

Finally, I should like to suggest that the best that can be hoped of the scheme is that it may prove a fairly efficient smokescreen.

Yours faithfully,

F. Beckett.

Berkeley Lodge,
Blandford.
September 1st, 1941.

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To the Editor of the Veterinary Record

Sir,—According to the supplement to *The Veterinary Record* of even date, the veterinary surgeon is to enter into a contract with the farmer wishing to participate in the scheme and to look to him for the fees, but rendering his report on the work done to the Ministry at the *end of each year*. I submit that the farmer should apply to the Ministry, nominating the veterinary surgeon he wishes to employ, and remitting the fee based on the animals in his herd at the time of his application. The Ministry, in turn, would pay the account of the veterinary surgeon at the end of each quarter, as it does with present work, from the accounts and reports rendered to it, *daily*, as the work is done.

In the Form of Contract printed on page 117 of the supplement referred to, a quotation is given for the price of sulphanilamide as if this drug was a panacea for all cases of mastitis. I repeat once again in these columns, that it is as futile, as it is pure charlatanism to attempt to treat any but a very acute case of mastitis, *immediately*, without knowledge of the causal organism. Sulphanilamide, like acriflavine infusion, is specific if it is applied to those cases of mastitis for which its use is indicated, and one might add, to which it is confined.

It is well to remember in this age of mechanical milking, that too much pressure may be the cause of an outbreak of mastitis, in which event its reduction is all that is required to stop the outbreak and to clear up existing cases.

The Ministry and those participating will be well advised to treat cases of mastitis only after the causal organism has been identified and other causes, such as the one just mentioned, excluded.

The scheme, to be the success we all desire it to be, should be taken over in its entirety by the Animal Health Division of the Ministry. I, for one, prefer, "Official Support" in case of dispute, and I do not resent criticism from that source on any work which I undertake, for when it is all over, I have the consolation that I shall not be left "whistling for my fee."

Yours faithfully,

J. F. D. Tutt.

Winchester.
August 30th, 1941.

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"A PRACTITIONER'S COMPLAINT"

To the Editor of the Veterinary Record

Sir,—Even in his misfortunes Mr. Shipley can talk grandly of "Capital," and of "leaving legacies to our children." I did once dream of such a kind of thing: that was long ago, and the dream might just as well have been of a dukedom; so in lieu of legacies I have taught my sons that if they lose on a hazard they should pay up without exclaiming too much about the luck and losses of the game. Each of us knows his own troubles, but the ageing "whole-time" man has a crumb of consolation: inured by long years of forced frugality he is able to view with indifferent eye a prospect which would surely give Mr. Shipley the shudders—that of existence on the "provision for old age" which is so little and of which so much has been made.

Yours faithfully,

Esmond Brown.

Bath.
August 31st, 1941.